(19)日本国特許庁（ＪＰ）　(12)**公開特許公報（Ａ）**　(11)特許出願公開番号

特開平6－249176

(43)公開日　平成６年(1994)９月６日

(51)Int.Cl.[5]	識別記号	庁内整理番号	ＦＩ	技術表示箇所
Ｆ０４Ｃ　29/02	３３１　Ａ	6907－3H		
	３２１　Ａ	6907－3H		

審査請求　未請求　請求項の数４　ＯＬ　（全　６　頁）

(21)出願番号　特願平5－40124

(22)出願日　平成５年(1993)３月１日

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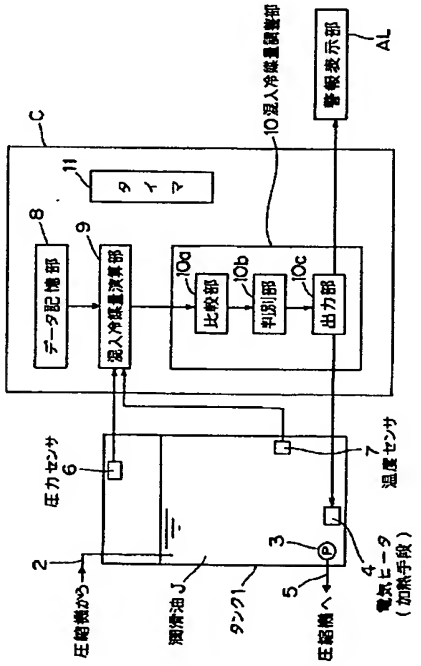
(54)【発明の名称】　冷凍機用潤滑油の調整装置

(57)【要約】

【構成】タンク１内の潤滑油Ｊの圧力、温度と、潤滑油Ｊへの混入冷媒量との関係データを予め記憶しておく。潤滑油Ｊの圧力と温度を検出し、これらと上記関係データに基づいて、混入冷媒量を求める。潤滑油Ｊを電気ヒータ４で加熱し、混入冷媒量がしきい値以下になるようにする。

【効果】精度良く検出できる温度、圧力等に基づいて混入冷媒量を求めるので、精度の良い混入冷媒量が得られる。潤滑油の粘度を最適に維持できる。圧縮機に潤滑不良、シール不良等を発生させない。冷凍機の信頼性を向上できる。



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【特許請求の範囲】

【請求項１】タンク（１）内に貯蔵された圧縮機用の潤滑油（Ｊ）の温度を検出する温度検出手段（７）と、
上記潤滑油（Ｊ）の圧力を検出する圧力検出手段（６）と、
潤滑油（Ｊ）の温度及び圧力と、潤滑油（Ｊ）内への混入冷媒量（Ｒ）との関係データを予め記憶しておくデータ記憶部（８）と、
検出された潤滑油（Ｊ）の温度及び圧力、並びにデータ記憶手段に記憶された関係データに基づいて、混入冷媒量（Ｒ）を演算する混入冷媒量演算部（９）と、
タンク（１）内の潤滑油（Ｊ）を加熱する加熱手段（４）と、
混入冷媒量演算部（９）により演算された混入冷媒量（Ｒ）と予め設定したしきい値（Ｒ１）とを比較し、しきい値（Ｒ１）を超えている場合に、加熱手段（４）に信号を出力してタンク（１）内の潤滑油（Ｊ）を加熱することにより、混入冷媒量（Ｒ）をしきい値（Ｒ１）以下にする混入冷媒量調整部（１０）とを備えたことを特徴とする冷凍機用潤滑油の調整装置。

【請求項２】上記加熱手段は、電気ヒータ（４）からなることを特徴とする請求項１記載の冷凍機用潤滑油の調整装置。

【請求項３】上記加熱手段は、圧縮機の吐出ガス（ＥＧ）を熱源としていることを特徴とする請求項１記載の冷凍機用潤滑油の調整装置。

【請求項４】タンク（１）内に貯蔵された圧縮機用の潤滑油（Ｊ）の温度を検出する温度検出手段（７）と、
上記潤滑油（Ｊ）の圧力を検出する圧力検出手段（６）と、
潤滑油（Ｊ）の温度及び圧力と、潤滑油（Ｊ）内への混入冷媒量（Ｒ）との関係データを予め記憶しておくデータ記憶部（８）と、
検出された潤滑油（Ｊ）の温度及び圧力、並びにデータ記憶手段に記憶された関係データに基づいて、混入冷媒量（Ｒ）を演算する混入冷媒量演算部（９）と、
タンク（１）内の潤滑油（Ｊ）を減圧する減圧手段（１５）と、
混入冷媒量演算部（９）により演算された混入冷媒量（Ｒ）と予め設定したしきい値（Ｒ１）とを比較し、しきい値（Ｒ１）を超えている場合に、減圧手段（１５）に信号を出力してタンク（１）内の潤滑油（Ｊ）を減圧することにより、混入冷媒量（Ｒ）をしきい値（Ｒ１）以下にする混入冷媒量調整部（１０）とを備えたことを特徴とする冷凍機用潤滑油の調整装置。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】この発明は、空気調和設備等に使用される冷凍機用潤滑油の調整装置に関するものである。

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【０００２】

【従来の技術】建物内部の空気調和設備に使用される冷凍機として、ターボ冷凍機がある。これは、ターボ圧縮機、駆動電動機、熱交換器（蒸発器、凝縮器）、伝導装置、抽気回収装置及び潤滑装置等から構成されている。この中で、潤滑装置は、圧縮機における運動部分の潤滑と圧縮機項のシール効果を良好にすることを目的としており、このためには、潤滑油の粘度が最適に管理しておく必要がある。

【０００３】ところが、冷凍機の運転に伴って潤滑油に冷媒が混入、攪拌されて溶け込み、このため、潤滑油の温度が除々に低下して圧縮機の運転に悪影響を与え、冷凍機の能力を低下させていた。そして、この状態が進行すると、保護装置が働いて冷凍機の運転を停止し、空調が不能に至るといった事態を招いていた。そこで、潤滑油の粘度を適正に維持するために、タンク内の潤滑油の重量と、タンク内の潤滑油の液面高さから算出した体積とに基づいて混入冷媒量を演算し、これが規定値を超えている場合に、加熱手段により潤滑油を加熱して所要量の冷媒を蒸発除去するようにした潤滑油の調整装置が提供されている（特開平２－４０４６６号公報参照）。

【０００４】

【発明が解決しようとする課題】ところが、上記の調整装置においては、タンク内への潤滑油の流入やタンクからの潤滑油の流出等の動的外乱の影響で、タンク内の潤滑油の液面は乱れているため、精度良く液面高さを検出できず、混入冷媒量を精度良く把握できない結果、潤滑油の粘度を最適に維持できなかった。

【０００５】そこで、この発明の目的は、上述の技術的課題を解決し、混入冷媒量を精度良く把握することができ、潤滑油の粘度を最適に維持することができる冷凍機用潤滑油の調整装置を実現することができる。

【０００６】

【課題を解決するための手段】上記の目的を達成するための請求項１に係る冷凍機用潤滑油の調整装置は、タンク内に貯蔵された圧縮機用の潤滑油の温度を検出する温度検出手段と、上記潤滑油の圧力を検出する圧力検出手段と、潤滑油の温度及び圧力と、潤滑油内への混入冷媒量との関係データを予め記憶しておくデータ記憶部と、検出された潤滑油の温度及び圧力、並びにデータ記憶手段に記憶された関係データに基づいて、混入冷媒量を演算する混入冷媒量演算部と、タンク内の潤滑油を加熱する加熱手段と、混入冷媒量演算部により演算された混入冷媒量と予め設定したしきい値とを比較し、しきい値を超えている場合に、加熱手段に信号を出力してタンク内の潤滑油を加熱することにより、混入冷媒量をしきい値以下にする混入冷媒量調整部とを備えたことを特徴とするものである。

【０００７】上記加熱手段は、電気ヒータからなる場合がある。上記加熱手段は、圧縮機の吐出ガスを熱源とし

ている場合がある。上記目的を達成するため請求項４に係る冷凍機用潤滑油の調整装置は、タンク内に貯蔵された圧縮機用の潤滑油の温度を検出する温度検出手段と、上記潤滑油の圧力を検出する圧力検出手段と、潤滑油の温度及び圧力と、潤滑油内への混入冷媒量との関係データを予め記憶しておくデータ記憶部と、検出された潤滑油の温度及び圧力、並びにデータ記憶手段に記憶された関係データに基づいて、混入冷媒量を演算する混入冷媒量演算部と、タンク内の潤滑油（Ｊ）を減圧する減圧手段と、混入冷媒量演算部により演算された混入冷媒量と予め設定したしきい値とを比較し、しきい値を超えている場合に、減圧手段に信号を出力してタンク内の潤滑油を減圧することにより、混入冷媒量をしきい値以下にする混入冷媒量調整部とを備えたことを特徴とするものである。

【０００８】

【作用】上記請求項１に係る発明の構成によれば、タンク内の潤滑油の温度と圧力を検出し、検出した温度、圧力とデータ記憶部に記憶された関係データに基づいて、混入冷媒量演算部が混入冷媒量を演算する。混入冷媒量調整部は、演算された混入冷媒量が予め設定したしきい値を超えている場合に、加熱手段によってタンク内の潤滑油を加熱することにより、冷媒を蒸発させ、混入冷媒量をしきい値以下にする。

【０００９】また、加熱手段が電気ヒータからなる場合には、応答性が良いので、潤滑油を素早く適正粘度にすることができる。さらに、加熱手段が圧縮機の吐出ガスを熱源としている場合には、省エネルギを達成できる。請求項４に係る発明の構成によれば、混入冷媒量調整部が、減圧手段によってタンク内を減圧することにより、冷媒を蒸発させ、混入冷媒量をしきい値以下にする。

【００１０】

【実施例】以下実施例を示す添付図面によって詳細に説明する。図１はこの発明の一実施例に係る冷凍機用潤滑油の調整装置の概要構成図であり、同図を参照して、図示しないターボ圧縮機を潤滑、シールする潤滑油Ｊを収容したタンク１の下部には、供給ライン２を介してターボ圧縮機へ潤滑油を圧送するポンプ３と、潤滑油Ｊを加熱する加熱手段としての電気ヒータ４とが配設され、また、タンク１の上部には、ターボ圧縮機からの潤滑油Ｊの戻りライン５が接続されている。この冷凍機用潤滑油の調整装置は、タンク１内に配設されタンク１内の圧力を検出する圧力センサ６と、タンク１内の潤滑油Ｊ内に配置され、タンク１内の潤滑油Ｊの温度を検出する温度センサ７と、上記電気ヒータ４と、タンク１の外部に配置され、検出された潤滑油Ｊの温度、圧力等に基づいて、電気ヒータ４をオンオフさせ、又警報表示部ＡＬに警報表示を行わせる制御部Ｃとを備えている。

【００１１】上記制御部Ｃは、潤滑油Ｊの温度Ｔ及び圧力Ｐと、潤滑油Ｊ内への混入冷媒量Ｒ（％）との関係データ（図２参照。同図において、実線はＲ２３のデータを示し、破線はＲ１１のデータを示している）を予め記憶しておくデータ記憶部８と、上記圧力センサ６及び温度センサ７によって検出された潤滑油Ｊの温度Ｔ及び圧力Ｐ、並びにデータ記憶部８に記憶された関係データに基づいて、混入冷媒量を演算する混入冷媒量演算部９と、この混入冷媒量演算部９により演算された混入冷媒量Ｒに基づいて当該混入冷媒量Ｒがしきい値Ｒ１以下になるように調整する混入冷媒量調整部１０と、所定時間（例えば２～３分）毎に混入冷媒量演算部９および混入冷媒量調整部１０を動作させるタイマ１１とを備えている。

【００１２】混入冷媒量調整部１０は、混入冷媒量演算部９により演算された混入冷媒量Ｒを予め設定したしきい値Ｒ１又はＲ２（Ｒ１＞Ｒ２）と比較する比較部１０ａと、混入冷媒量Ｒがしきい値Ｒ１又はＲ２を超えているか否かを判別し、超えている場合に所定の信号を発する判別部１０ｂと、この判別部１０ｂからの信号を受けて、電気ヒータ４にタンク１内の潤滑油Ｊを加熱させる信号、又は警報表示部ＡＬに“溶け込み過大”の表示をさせて圧縮機を停止させる信号を出力する出力部１０ｃとを備えている。

【００１３】次に、この制御部Ｃの動作について図３のフローチャートに基づいて説明する。ターボ圧縮機の起動に伴って、タイマ１が起動され（ステップｓ１）、所定時間ｔ１の経過が待たれる（ステップｓ２）。これは、各状態量が安定するのを待つ趣旨である。所定時間ｔ１の経過後、温度センサ７及び圧力センサ６によって検出された、タンク１内の潤滑油Ｊの温度Ｔ及び圧力Ｐが入力され（ステップｓ３）、これら温度Ｔ，圧力Ｐ及びデータ記憶部８に記憶されている関係データに基づいて、混入冷媒量演算部９が、混入冷媒量Ｒを演算する（ステップｓ４）。そして、混入冷媒量Ｒと予め設定したしきい値Ｒ１とを比較し（ステップｓ５）、混入冷媒量Ｒがしきい値Ｒ１以上の場合には、“溶け込み過大”の警報表示を行った（ステップｓ６）後、ターボ圧縮機を停止させる（ステップｓ７）。また、混入冷媒量Ｒがしきい値Ｒ１を超えていない場合には、混入冷媒量Ｒと予め設定したしきい値Ｒ２とを比較する（ステップｓ８）。混入冷媒量Ｒがしきい値Ｒ２を超えていない場合には、電気ヒータ４をＯＦＦした（ステップｓ９）後、ステップｓ１に戻り、超えている場合には、電気ヒータ４をＯＮして潤滑油を加熱し（ステップｓ１０）、起動からの経過時間がｔ２になるまで待った（ステップｓ１１）後、ステップｓ１に戻る。

【００１４】この実施例によれば、精度良く検出することのできる、潤滑油Ｊの温度Ｔ、圧力Ｐ等に基づいて、混入冷媒量Ｒを求めるので、精度の良い混入冷媒量Ｒが得られる。そして、混入冷媒量Ｒを精度良く把握しながら、これがしきい値Ｒ２以下になるように調整するの

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で、潤滑油Ｊの粘度を最適に維持することができる。したがって、圧縮機に潤滑不良、シール不良等を発生させることがなく、冷凍機の能力低下等もなくなるので、冷凍機の信頼性を向上させることができる。

【００１５】また、加熱手段として、電気ヒータ４を用いたので、応答性良く潤滑油Ｊ内の冷媒を加熱蒸発させることができ、素早く、潤滑油Ｊの粘度を調整することができる。図４はこの発明の他の実施例を示す概略図であり、同図を参照して、この実施例が図１の実施例と異なるのは、インベラＩの吐出側ＩＯを、タンク１内を経由した状態で凝縮器１３と接続させる、加熱手段としての吐出ガス管路１２を、設け、吐出ガスＥＧの熱を用いてタンク１内の潤滑油Ｊを加熱蒸発させるようにしたことである。吐出ガス管路１２は、タンク１内において、熱交換部分１２ａを有している。また、タンク１外において吐出ガス管路１２の途中部には、当該管路１２を開閉する電磁弁１４が介装されている。混入冷媒量Ｒがしきい値Ｒ２を超える場合には、電磁弁１４を開放して吐出ガスＥＧによって潤滑油Ｊを加熱し、超えていない場合には、電磁弁１４を閉じ加熱を行わない。一般に、タンク１内の潤滑油Ｊの温度が４０～６０°Ｃであるのに対して、吐出ガスＥＧの温度は１００°Ｃ程度であり、吐出ガスＥＧによって充分加熱可能である。

【００１６】この実施例によれば、図１の実施例と同様の作用効果を奏することに加えて、外部入熱がないため、冷凍機効率の低下がなく、したがって、省エネルギを達成することができる。また、吐出ガスＥＧにより加熱するので、凝縮器１３の負荷を減少させることができる。なお、この発明は、上記各実施例に限定されるものではなく、加熱手段に代えて、タンク１内を減圧する減圧手段としての減圧管路１５を用いることができる（図５参照）。この減圧管路１５は、タンク１内とインベラＩの吸い込み側ＩＳとを連通している。また、この減圧管路１５の途中部には、当該減圧管路１５を開閉する電磁弁１６が介装されている。この場合、混入冷媒量調整部１０は、混入冷媒量演算部９により演算された混入冷媒量Ｒと予め設定したしきい値Ｒ２とを比較し、しきい値Ｒ２を超えている場合に、電磁弁１６を開放してタンク１内の潤滑油Ｊを減圧することにより、冷媒を蒸発させ、混入冷媒量Ｒをしきい値Ｒ１以下にする。この実施例においても、図１の実施例と同様の作用効果を奏する。

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【００１７】なお、この発明は、上記各実施例に限定されるものではなく、この発明の要旨を変更しない範囲で種々の変更を施すことが可能である。

【００１８】

【発明の効果】以上のように、請求項１に係る発明によれば、検出精度の良い潤滑油の温度、圧力等に基づいて、混入冷媒量を求めるので、精度の良い混入冷媒量が得られる。そして、混入冷媒量を精度良く把握しながら、これがしきい値以下になるように調整するので、潤滑油の粘度を最適に維持することができる。したがって、圧縮機に潤滑不良、シール不良等を発生させることがなく、冷凍機の能力低下等もなくなるので、冷凍機の信頼性を向上させることができる。

【００１９】また、加熱手段が電気ヒータからなる場合には、応答性が良いので、潤滑油を素早く最適な粘度にすることができる。さらに、加熱手段が圧縮機の吐出ガスを熱源としている場合には、省エネルギを達成できる。請求項４に係る発明によれば、減圧手段によってタンク内を減圧することにより、冷媒を蒸発させて混入冷媒量をしきい値以下にし、請求項１に係る発明と同様の効果を奏する。

【図面の簡単な説明】

【図１】この発明の一実施例としての冷凍機用潤滑油の調整装置の概略構成図。

【図２】潤滑油の温度、圧力と潤滑油への混入冷媒量との関係を示す図である。

【図３】制御の流れを示すフローチャートである。

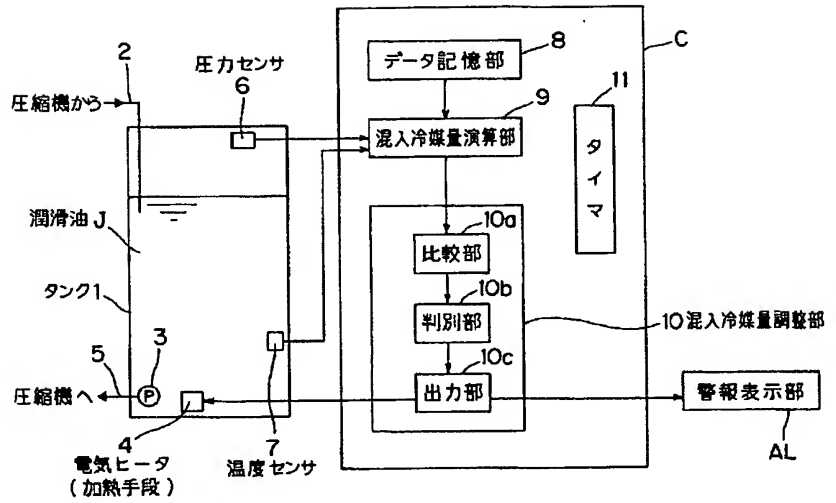
【図４】この発明の他の実施例としての冷凍機用潤滑油の調整装置の概略図である。

【図５】この発明のさらに他の実施例としての冷凍機用潤滑油の調整装置の概略図である。

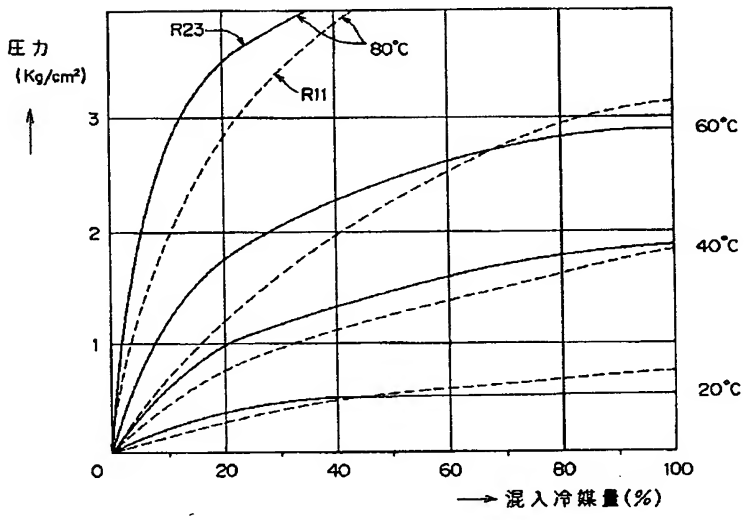
【符号の説明】

１　タンク
Ｊ　潤滑油
４　電気ヒータ（加熱手段）
６　圧力センサ（圧力検出手段）
７　温度センサ（温度検出手段）
８　データ記憶部
９　混入冷媒量演算部
１０　混入冷媒量調整部
１２　吐出ガス管路（加熱手段）
１５　減圧管路（減圧手段）

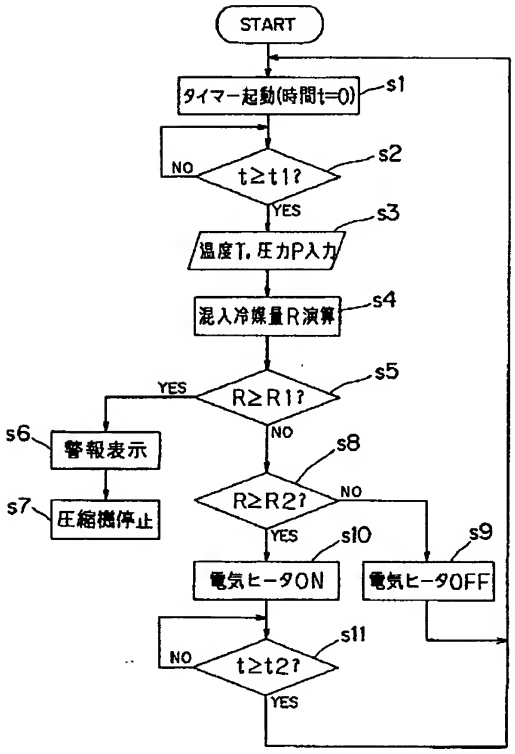
【図1】


2
圧力センサ
6
圧縮機から
データ記憶部
8
C
11
9
混入冷媒量演算部
タイマ
潤滑油 J
10a
比較部
タンク1
10b
判別部
10 混入冷媒量調整部
3
5
圧縮機へ
P
10c
出力部
警報表示部
4
7
AL
電気ヒータ
（加熱手段）
温度センサ

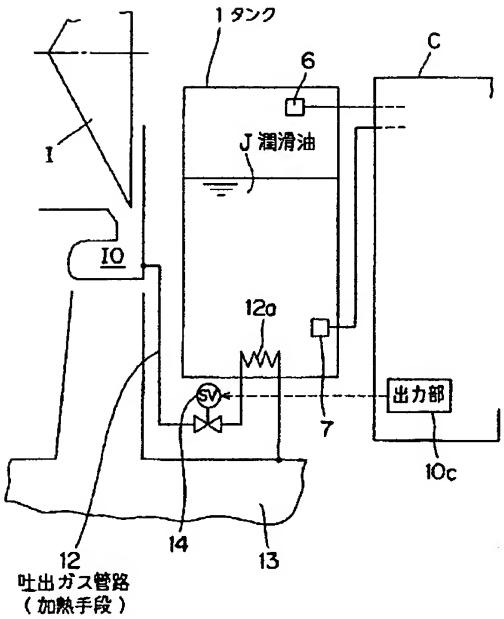
【図2】


圧力
(Kg/cm²)
R23
80°C
R11
3
2
1
60°C
40°C
20°C
0
20
40
60
80
100
混入冷媒量(%)

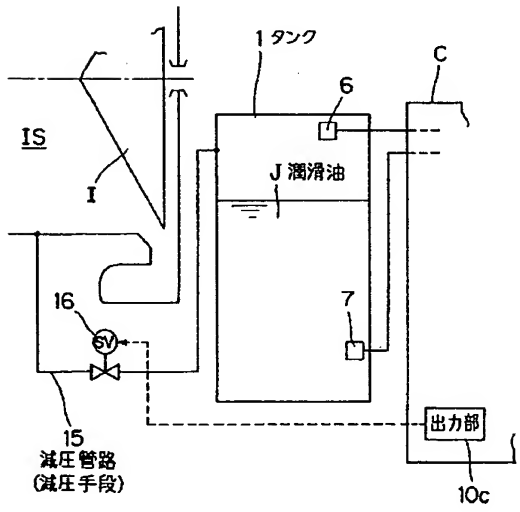
【図3】


START
タイマー起動(時間t=0)
s1
t≧t1?
NO
YES
s2
温度T, 圧力P入力
s3
混入冷媒量R演算
s4
R≧R1?
YES
NO
s5
警報表示
s6
圧縮機停止
s7
R≧R2?
NO
YES
s8
電気ヒータON
s10
電気ヒータOFF
s9
t≧t2?
NO
YES
s11

【図4】


1タンク
C
6
I
J 潤滑油
IO
12a
SV
出力部
7
10c
12
吐出ガス管路
(加熱手段)
14
13

【図5】


1タンク
C
6
IS
I
J 潤滑油
16
SV
7
15
減圧管路
(減圧手段)
出力部
10c

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 06-249176

(43)Date of publication of application : 06.09.1994

(51)Int.Cl. F04C 29/02
F04C 29/02

(21)Application number : 05-040124

(22)Date of filing : 01.03.1993

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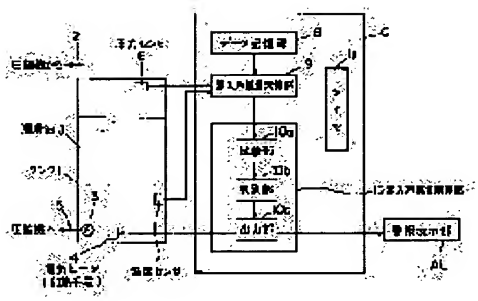
(72)Inventor : ADACHI YASUNORI
TAKADA YASUTAKA

(54) REFRIGERATOR LUBRICATING OIL ADJUSTING DEVICE

(57)Abstract:

PURPOSE: To optimize the viscosity of lubricating oil by measuring the temperature and pressure of lubricating oil, calculating the amount of mixed refrigerant using related data between both of them in a storing part and mixed refrigerant amount, and heating the lubricating oil in a tank when it exceeds a set threshold to reduce the amount of mixed refrigerant.

CONSTITUTION: The temperature and pressure of lubricating oil J in a tank 1 is detected by a temperature sensor 7 and a pressure sensor 6, and inputted into a mixed refrigerant amount calculation part 9. The mixed refrigerant amount calculation part 9 calculates the amount of mixed refrigerant in the lubricating oil using the detected temperature, detected pressure, and related data stored in a data storing part 8. The calculated amount of refrigerant is inputted into a mixed refrigerant amount adjusting part 10, and compared with a threshold in a comparing part 10a. A judgment part 10b outputs a specified signal to an output part 10c when the amount of calculated refrigerant exceeds the threshold. The output part 10c drives an electric heater 4 to heat the lubricating oil J and displays on a warning display part AL. Thus the amount of mixed refrigerant is adjusted below the threshold while catching it accurately therefore, the viscosity of the lubricating oil can be most appropriately.



LEGAL STATUS

[Date of request for examination]	31.01.2000
[Date of sending the examiner's decision of rejection]	
[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]	
[Date of final disposal for application]	
[Patent number]	3306958
[Date of registration]	17.05.2002

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] A temperature detection means to detect the temperature of the lubricating oil for compressors (J) stored in the tank (1) (7), A pressure detection means (6) to detect the pressure of the above-mentioned lubricating oil (J), and the temperature and the pressure of a lubricating oil (J), The data storage section which memorizes beforehand relational data with the amount of mixing refrigerants (R) into a lubricating oil (J) (8), The amount operation part of mixing refrigerants which calculates the amount of mixing refrigerants (R) based on the relational data memorized by the temperature of the detected lubricating oil (J) and the pressure, and the list at the data storage means (9), A heating means (4) to heat the lubricating oil (J) in a tank (1) is compared with the amount of mixing refrigerants (R) calculated by the amount operation part of mixing refrigerants (9) and the threshold (R1) set up beforehand. The adjusting device of the lubricating oil for refrigerators characterized by having the amount controller of mixing refrigerants (10) which makes the amount of mixing refrigerants (R) below a threshold (R1) by outputting a signal to a heating means (4) and heating the lubricating oil (J) in a tank (1) when it is over the threshold (R1).
[Claim 2] The above-mentioned heating means is the adjusting device of the lubricating oil for refrigerators according to claim 1 characterized by consisting of an electric heater (4).
[Claim 3] The above-mentioned heating means is the adjusting device of the lubricating oil for refrigerators according to claim 1 characterized by making the regurgitation gas (EG) of a compressor into a heat source.
[Claim 4] A temperature detection means to detect the temperature of the lubricating oil for compressors (J) stored in the tank (1) (7), A pressure detection means (6) to detect the pressure of the above-mentioned lubricating oil (J), and the temperature and the pressure of a lubricating oil (J), The data storage section which memorizes beforehand relational data with the amount of mixing refrigerants (R) into a lubricating oil (J) (8), The amount operation part of mixing refrigerants which calculates the amount of mixing refrigerants (R) based on the relational data memorized by the temperature of the detected lubricating oil (J) and the pressure, and the list at the data storage means (9), A reduced pressure means (15) to decompress the lubricating oil (J) in a tank (1) is compared with the amount of mixing refrigerants (R) calculated by the amount operation part of mixing refrigerants (9) and the threshold (R1) set up beforehand. The adjusting device of the lubricating oil for refrigerators characterized by having the amount controller of mixing refrigerants (10) which makes the amount of mixing refrigerants (R) below a threshold (R1) by outputting a signal to a reduced pressure means (15), and decompressing the lubricating oil (J) in a tank (1) when it is over the threshold (R1).

[Translation done.]

* NOTICES *

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the adjusting device of the lubricating oil for refrigerators used for an air conditioning system etc.
[0002]
[Description of the Prior Art] There is a turbo refrigerating machine as a refrigerator used for the air conditioning system inside a building. This consists of a turbocompressor, a driving motor, the heat exchanger (an evaporator, condenser), a gear, a bleeding recovery system, a lubricating device, etc. In this, the lubricating device aims at making good the seal effectiveness of the lubrication of a moving part, and a compressor term in a compressor, and, for that, the viscosity of a lubricating oil needs to manage it the optimal.
[0003] However, for penetration and this reason, it follows on operation of a refrigerator, and a refrigerant is mixed and stirred by the lubricating oil, and it falls to ****, and the temperature of a lubricating oil had a bad influence on operation of a compressor, and was reducing the capacity of a refrigerator. And when this condition advanced, the protective device worked, operation of a refrigerator was suspended and the situation where air-conditioning resulted in impossible was caused. Then, in order to maintain the viscosity of a lubricating oil proper, when the amount of mixing refrigerants is calculated based on the weight of the lubricating oil in a tank, and the volume computed from the oil-level height of the lubricating oil in a tank and this is over default value, the adjusting device of the lubricating oil which heats a lubricating oil with a heating means and was made to carry out evaporation removal of the refrigerant of requirements is offered (refer to JP,2-40466,A).
[0004]
[Problem(s) to be Solved by the Invention] However, in the above-mentioned adjusting device, it was the effect of dynamic disturbance, such as an inflow of the lubricating oil into a tank, and an outflow of the lubricating oil from a tank, and the oil level of the lubricating oil in a tank was not able to maintain viscosity of a lubricating oil the optimal, as a result of being unable to detect oil-level height with a sufficient precision and being unable to grasp the amount of mixing refrigerants with a sufficient precision, since it is confused.
[0005] Then, the purpose of this invention can solve an above-mentioned technical technical problem, can grasp the amount of mixing refrigerants with a sufficient precision, and can realize the adjusting device of the lubricating oil for refrigerators which can maintain the viscosity of a lubricating oil the optimal.
[0006]
[Means for Solving the Problem] The adjusting device of the lubricating oil for refrigerators concerning claim 1 for attaining the above-mentioned purpose A temperature detection means to detect the temperature of the lubricating oil for compressors stored in the tank, A pressure detection means to detect the pressure of the above-mentioned lubricating oil, and the temperature and the pressure of a lubricating oil, The data storage section which memorizes beforehand relational data with the amount of mixing refrigerants into a lubricating oil, The amount operation part of mixing refrigerants which calculates the amount of mixing refrigerants

based on the relational data memorized by the temperature of the detected lubricating oil and the pressure, and the list at the data storage means, A heating means to heat the lubricating oil in a tank is compared with the amount of mixing refrigerants calculated by the amount operation part of mixing refrigerants and the threshold set up beforehand. When it is over the threshold, it is characterized by having the amount controller of mixing refrigerants which makes the amount of mixing refrigerants below a threshold by outputting a signal to a heating means and heating the lubricating oil in a tank.

[0007] The above-mentioned heating means may consist of an electric heater. The above-mentioned heating means may make the regurgitation gas of a compressor the heat source. The adjusting device of the lubricating oil for refrigerators applied to claim 4 in order to attain the above-mentioned purpose A temperature detection means to detect the temperature of the lubricating oil for compressors stored in the tank, A pressure detection means to detect the pressure of the above-mentioned lubricating oil, and the temperature and the pressure of a lubricating oil, The data storage section which memorizes beforehand relational data with the amount of mixing refrigerants into a lubricating oil, The amount operation part of mixing refrigerants which calculates the amount of mixing refrigerants based on the relational data memorized by the temperature of the detected lubricating oil and the pressure, and the list at the data storage means, A reduced pressure means to decompress the lubricating oil in a tank (J) is compared with the amount of mixing refrigerants calculated by the amount operation part of mixing refrigerants and the threshold set up beforehand. When it is over the threshold, it is characterized by having the amount controller of mixing refrigerants which makes the amount of mixing refrigerants below a threshold by outputting a signal to a reduced pressure means and decompressing the lubricating oil in a tank.

[0008]

[Function] According to the configuration of invention concerning above-mentioned claim 1, the temperature and the pressure of a lubricating oil in a tank are detected, and the amount operation part of mixing refrigerants calculates the amount of mixing refrigerants based on the relational data memorized by the temperature and the pressure which were detected, and the data storage section. When the calculated amount of mixing refrigerants is over the threshold set up beforehand, by heating the lubricating oil in a tank with a heating means, the amount controller of mixing refrigerants evaporates a refrigerant, and makes the amount of mixing refrigerants below a threshold.

[0009] Moreover, since responsibility is good when a heating means consists of an electric heater, a lubricating oil can be quickly made into proper viscosity. Furthermore, energy saving can be attained when the heating means makes the regurgitation gas of a compressor the heat source. According to the configuration of invention concerning claim 4, by decompressing the inside of a tank with a reduced pressure means, the amount controller of mixing refrigerants evaporates a refrigerant, and makes the amount of mixing refrigerants below a threshold.

[0010]

[Example] The accompanying drawing which shows an example below explains to a detail. Drawing 1 is the outline block diagram of the adjusting device of the lubricating oil for refrigerators concerning one example of this invention, and refers to this drawing. In the lower part of the tank 1 which held lubrication and the lubricating oil J which carries out a seal, the turbocompressor which is not illustrated The pump 3 which feeds a lubricating oil to a turbocompressor through a supply line 2, and the electric heater 4 as a heating means which heats a lubricating oil J are arranged, and the return line 5 of the lubricating oil J from a turbocompressor is connected to the upper part of a tank 1. The pressure sensor 6 which the adjusting device of this lubricating oil for refrigerators is arranged in a tank 1, and detects the pressure in a tank 1, The temperature sensor 7 which is arranged in the lubricating oil J in a tank 1, and detects the temperature of the lubricating oil J in a tank 1, It has the control section C which it is arranged [control section], and makes the above-mentioned electric heater 4 and the exterior of a tank 1 turn an electric heater 4 on and off based on the temperature of the detected lubricating oil J, a pressure, etc., and makes an alarm display perform in the alarm-display section AL.

[0011] The above-mentioned control section C is relational data (refer to drawing 2 .) with the temperature T of a lubricating oil J, and pressure P and amount [into a lubricating oil J] of mixing refrigerants R (%). in this drawing, a continuous line shows the data of R23 and a broken line shows the data of R11 -- **** -- with the data storage section 8 memorized beforehand The amount operation part 9 of mixing refrigerants which calculates the amount of mixing refrigerants based on the relational data memorized by the temperature T and the pressure P, and list of the lubricating oil J detected by the above-mentioned pressure sensor 6 and the temperature sensor 7 at the data storage section 8, The amount controller 10 of mixing refrigerants adjusted so that the amount R of mixing refrigerants concerned may become less than [threshold R1] based on the amount R of mixing refrigerants calculated by this amount operation part 9 of mixing refrigerants, Every predetermined time (for example, 2 - 3 minutes) is equipped with the timer 11 which operates the amount operation part 9 of mixing refrigerants, and the amount controller 10 of mixing refrigerants.

[0012] The threshold R1 which set up beforehand the amount R of mixing refrigerants which calculated the amount controller 10 of mixing refrigerants by the amount operation part 9 of mixing refrigerants, or comparator 10a in comparison with R2 (R1> R2), Distinction section 10b which emits a predetermined signal when it distinguishes and is over whether the amount R of mixing refrigerants is over a threshold R1 or R2, In response to the signal from this distinction section 10b, it has output section 10c which outputs the signal which makes an electric heater 4 heat the lubricating oil J in a tank 1, or the signal which displays "overpenetration" on the alarm-display section AL, and stops a compressor.

[0013] Next, actuation of this control section C is explained based on the flow chart of drawing 3 . With starting of a turbocompressor, a timer 1 is started (step s1) and it waits for progress of predetermined time t1 (step s2). This is the meaning which waits to stabilize each quantity of state. The temperature T and the pressure P of a lubricating oil J in a tank 1 which were detected by the temperature sensor 7 and the pressure sensor 6 after progress of predetermined time t1 are inputted (step s3), and the amount operation part 9 of mixing refrigerants calculates the amount R of mixing refrigerants based on the relational data memorized by these temperature T, a pressure P, and the data storage section 8 (step s4). And the amount R of mixing refrigerants is compared with the threshold R1 set up beforehand (step s5), and when the amount R of mixing refrigerants is more than threshold R1, a turbocompressor is stopped after performing the alarm display of "overpenetration" (step s6) (step s7). Moreover, when the amount R of mixing refrigerants is not over the threshold R1, the amount R of mixing refrigerants is compared with the threshold R2 set up beforehand (step s8). When the amount R of mixing refrigerants is not over the threshold R2, return and when having exceeded, after waiting to it until it turns on an electric heater 4 to the step s1 after turning off an electric heater 4 (step s9), it heats a lubricating oil to it (step s10) and the elapsed time from starting becomes it t2 (step s11), it returns to it at step s1.

[0014] Since the amount R of mixing refrigerants is calculated based on temperature T, a pressure P, etc. of a lubricating oil J detectable with a sufficient precision according to this example, the accurate amount R of mixing refrigerants is obtained. And since it adjusts grasping the amount R of mixing refrigerants with a sufficient precision so that this may become less than [threshold R2], the viscosity of a lubricating oil J is maintainable the optimal. Therefore, since a compressor is not made to generate poor lubrication and a poor seal and the capacity fall of a refrigerator etc. is lost, the dependability of a refrigerator can be raised.

[0015] Moreover, as a heating means, since the electric heater 4 was used, responsibility can improve the refrigerant in a lubricating oil J heating evaporation, it is quick and the viscosity of a lubricating oil J can be adjusted. Drawing 4 is the schematic diagram showing other examples of this invention, and this example's differing from the example of drawing 1 with reference to this drawing is forming the regurgitation gas pipe way 12 as a heating means connecting the discharge side IO of Impeller I to a condenser 13 in the condition of having gone via the inside of a tank 1, and having been made to carry out heating evaporation of the lubricating oil J in a tank 1 using the heat of regurgitation gas EG. The regurgitation gas pipe way 12 has heat exchange partial 12a in the tank 1. Moreover, the solenoid valve 14 which opens and closes the duct 12

concerned is infixed in the section out of the tank 1 in the middle of the regurgitation gas pipe way 12. When the amount R of mixing refrigerants exceeds a threshold R2, a solenoid valve 14 is opened wide, and when heating a lubricating oil J and having not exceeded by regurgitation gas EG, it does not heat by closing a solenoid valve 14. Generally, to the temperature of the lubricating oil J in a tank 1 being 40-60-degreeC, the temperature of regurgitation gas EG is about [100 degrees] C, and can be enough heated by regurgitation gas EG.

[0016] Since there is [according to this example] no external heat input in addition to doing so the same operation effectiveness as the example of drawing 1 , there is no decline in refrigerator effectiveness, therefore energy saving can be attained. Moreover, since it heats by regurgitation gas EG, the load of a condenser 13 can be decreased. In addition, this invention is not limited to each above-mentioned example, can be replaced with a heating means, and the reduced pressure duct 15 as a reduced pressure means to decompress the inside of a tank 1 can be used (refer to drawing 5). This reduced pressure duct 15 is opening the suction Impeller I side IS for free passage in a tank 1. Moreover, the solenoid valve 16 which opens and closes the reduced pressure duct 15 concerned is infixed in the section in the middle of this reduced pressure duct 15. In this case, when the amount R of mixing refrigerants calculated by the amount operation part 9 of mixing refrigerants is compared with the threshold R2 set up beforehand and it is over the threshold R2, by opening a solenoid valve 16 wide and decompressing the lubricating oil J in a tank 1, the amount controller 10 of mixing refrigerants evaporates a refrigerant, and makes the amount R of mixing refrigerants less than [threshold R1]. Also in this example, the same operation effectiveness as the example of drawing 1 is done so.

[0017] In addition, this invention can perform modification various in the range which is not limited to each above-mentioned example and does not change the summary of this invention.

[0018]

[Effect of the Invention] As mentioned above, according to invention concerning claim 1, since the amount of mixing refrigerants is calculated based on the temperature of a lubricating oil with a sufficient detection precision, a pressure, etc., the accurate amount of mixing refrigerants is obtained. And since it adjusts grasping the amount of mixing refrigerants with a sufficient precision so that this may become below a threshold, the viscosity of a lubricating oil is maintainable the optimal. Therefore, since a compressor is not made to generate poor lubrication and a poor seal and the capacity fall of a refrigerator etc. is lost, the dependability of a refrigerator can be raised.

[0019] Moreover, since responsibility is good when a heating means consists of an electric heater, a lubricating oil can be made into the optimal quick viscosity. Furthermore, energy saving can be attained when the heating means makes the regurgitation gas of a compressor the heat source. According to invention concerning claim 4, by decompressing the inside of a tank with a reduced pressure means, a refrigerant is evaporated, the amount of mixing refrigerants is made below into a threshold, and the same effectiveness as invention concerning claim 1 is done so.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The outline block diagram of the adjusting device of the lubricating oil for refrigerators as one example of this invention.
[Drawing 2] It is drawing showing the relation between the temperature of a lubricating oil, a pressure, and the amount of mixing refrigerants to a lubricating oil.
[Drawing 3] It is the flow chart which shows a control flow.
[Drawing 4] It is the schematic diagram of the adjusting device of the lubricating oil for refrigerators as other examples of this invention.
[Drawing 5] It is the schematic diagram of the adjusting device of the lubricating oil for refrigerators as an example of further others of this invention.
[Description of Notations]
1 Tank
J Lubricating oil
4 Electric Heater (Heating Means)
6 Pressure Sensor (Pressure Detection Means)
7 Temperature Sensor (Temperature Detection Means)
8 Data Storage Section
9 The Amount Operation Part of Mixing Refrigerants
10 The Amount Controller of Mixing Refrigerants
12 Regurgitation Gas Pipe Way (Heating Means)
15 Reduced Pressure Duct (Reduced Pressure Means)

[Translation done.]